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DEPARTMENT OF ECOLOGY

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Dean Fowler, Project Manager
Utility Division
Spokane County Public Works
N. 811 Jefferson Street
Spokane, Washington 99260-0180

RE: Ecology Comments on Colbert Landfill Phase I Draft Report

Dear Mr. Fowler:

Ecology has reviewed the report and has provided comments within this letter. We find the estimation of aquifer transmissivity and storage coefficient to be very thorough, and the hydrogeologic description advances our understanding of the site. The treatability study is adequate, and the air modeling is in agreement with previously established protocols. Many conclusions and opinions cannot be verified.

As per our discussion at the meeting on September 26, 1991, Ecology requires a response to the comments prior to finalizing the report. Specific comments are as follows:

1. Statements on page 4-35 imply that Ecology and EPA must approve the Phase I report before Phase II design begins. However, as written, the report contains interpretative conclusions and opinions not necessary for Phase II, but which may be influential regarding other compliance issues and legal matters. Also, we are unable to substantiate some of the conclusions, and disagree with some of the opinions. Consequently, it will be very difficult for Ecology to approve the report unless significant revisions are made.

   Ecology could concur with the design parameters, i.e transmissivity, storage coefficient, etc. However, we find no summary of design parameters. We are willing to provide reassurances for Phase I, and suggest discussing this topic at a mutually agreeable time.

2. Much of the Executive Summary provides rationale for why the South, West, and East extraction systems will be different from the conceptual model provided in the ROD. However, the differences themselves are not described or identified. As these differences represent a change in thinking since the ROD was

signed, we are interested in the magnitude of the differences. Please describe the differences quantitatively, to the extent possible, and display the differences conceptually on Figure ER 1.2.

3. The last paragraph of the executive summary implies something is abnormal with Phase II. The statement is made that the design of Phase II requires early estimates of loading estimates and constituent concentrations, but it is later stated that these estimates are normally developed in latter stages of design. Please elaborate on the timing of the loading estimates. In particular, does the timing pose any technical concern for an efficient cleanup of the site?

4. Phase I has expanded the understanding of hydrogeology defined in the Remedial Investigation (RI), and in some cases has provided new information sufficient to alter the conceptional model of the extraction system provided in the ROD. Section 4.2 states that these differences may even impact Phase II design. Throughout the report, references are made to an individual change in RI hydrogeology, but each reference provides only a piece of the picture. A comprehensive summary of how the hydrogeology in this report differs from the RI hydrogeology should be provided in a separate section to demonstrate why the Remedial Investigation is no longer the definitive reference for hydrogeology.

5. A section discussing the environmental permitting requirements for the project should be made in the Phase I report. If substantive requirements rather than administrative requirements are to be met they should be identified. In particular, estimates for loading to the Little Spokane River from treatment discharge should be provided. Estimates for air emissions should also be provided.

6. What is the fate of the infiltration system used for testing the South Systems Pilot Facility? If the system remains as is, will it be shown on the deed to the property?

7. Is the infiltration system to be used again? If not, then please make a statement to that effect. Use of the infiltration system for long term operation would most likely require a state permit.

8. The impact of the estimated 2000 gallons per minute discharge to the Little Spokane River should be discussed.

9. Please substantiate the conclusion made in Section 4.3.1 that compounds detected in the lower aquifers other than the Constituents of Concern were present in low concentrations and

only in a limited number of wells. How is "low" defined? What is a "limited" number of wells?

10. A single round of sampling is normally not sufficient to eliminate the search for detected contaminants in a drinking water aquifer at a superfund site. Please explain in Section 4.3.1. the rationale for eliminating contaminants, other then the contaminants of concern, from future sampling rounds when those contaminants were detected in the first round. What contaminants were detected? What were their concentrations? Why were they eliminated?

11. One reason given in section 3.3 for the lack of accuracy and consistency of the geophysical survey is higher conductivity of groundwater associated with landfill leachate (page 3-4). This reason implies a leachate problem associated with the landfill. We find no support in the report for this reason. Either provide support, strike the reason, or outline steps to investigate the problem.

12. Regarding the discussion of landfill leachate in section 4.3.4 the statement is made that monitoring wells CD-30A and CD-21C1 are located in areas where landfill leachate would be anticipated and that Chloride, hardness, TDS, TOX, calcium and conductivity in these wells are slightly elevated while the Ph is somewhat lower than normal. These statements of judgement (i.e. "slightly elevated" and "somewhat lower than normal") require the identification of the specific data on which they are based.

13. Please strike the word "apparently" from the first sentence of the last paragraph on page 3-8. Use of apparently in describing whether or not the criteria were exceeded contradicts the last paragraph and the proceeding paragraph which describe how the criteria were exceeded.

14. Figure ER 1-3 is labeled as a Pre-Project Geologic Schematic. "Pre-Project" is a nondescript term. As the geology in the figure comes from the Remedial Investigation, we ask the figure be labeled "Remedial Investigation Geologic Schematic" and that a date for the interpretation be provided.

15. In Section 4.2.1. the statement is made that aquifer parameters are overestimated and that this over estimation is appropriate for Phase II. Please identify in section 4.2.1. or in section 4.2.3.2. which aquifer parameters are over estimated. We do not agree with the blanket statement that over estimated parameters are appropriate for Phase II design. For example, a low value of transmissivity seems more appropriate then a high value when determining the spacing for extraction wells. Appendix E does not give a summary of which parameters are overestimated.

16. In regard to the statement made at the end of the forth paragraph on page 4-12, a high transmissivity or the dampening of percolation could also explain the lack of seasonal water level fluctuation. Why was the lack of fluctuation attributed to a significant recharge source? What other possible causes were rejected?

17. In section 4.2.3.2. it is stated that step drawdown tests were not preformed due to treatment limitations. However, step drawdown tests have been necessary to determine the efficiency of the extraction wells at many other sites, and are a routine step in long term, high yield wells. If step drawdown tests are not to be performed please make a statement to that effect and justify why the tests are not going to be performed.

18. In regard to the conclusion drawn in the last paragraph of section 4.2.4.1. that the Little Spokane River appears to be the primary source of discharge for the lower sand and gravel aquifer, we do not find the single gradient measurement convincing. Also, we do not follow the logic that the river is primary source of discharge based on the elevation difference between the water level in well CD-40 and the river stage at Dartford. (Where is Dartford?) Please clarify the evidence for the conclusion.

19. In regard to calculation of well efficiency in section 4.2.3.2 by use of distance drawdown, were the effects of partial penetration taken into account? Also, we require the calculations for all well efficiency estimations in order to validate the efficiency.

20. In regard to the calculated well efficiencies of 40 to 50 percent, the statement is made on page 4-16 that actual well efficiencies are expected to be higher. How much higher are efficiencies expected to be? What value of well efficiency will be used for Phase II design purposes. Also, an efficiency value of 38.9 percent is reported on page E-15 of Volume III.

21. There is some apparent contradiction in the description of the Basalt Aquifer, east of the landfill. In Section 5.0 the Basalt aquifer is stated as having an apparent capacity of 5 gpm which limits the effectiveness of groundwater extraction for remedial purposes. In Section 4.2.6 private well pumping in the basalt aquifer, east of the landfill, is given as a possible reason for migration of contamination thus indicating a permeable basalt aquifer. We suggest limiting discussion of the flow characteristics of the basalt aquifer to a single section.

22. We are unable to verify the conclusion made in section 4.3 that the Upper Sand/Gravel Aquifer, and possibly the shallow interbeds of the Lacustrine Aquitard, recharge the Fluvial Aquifer through springs, and appear to be the source of the Constituents of

Concern detected therein. Please reference data or measurements to support the conclusion.

23. Please provide a table showing the density, solubility, partition coefficient, vapor pressure and other pertinent physical and chemical characteristics of the Contaminants of Concern as they relate to their fate and transport in groundwater, in an air stripping tower, and in the atmosphere.

24. There is confusion over the trough in the upper surface of the Lacustrine Unit. In section 4.2 the trough is described as an apparent trough, based on limited data. Reference is made to the vicinity of pilot well CP-S1 on cross section ER. 4.9. But cross section ER 4.9 does not display well CP-S1. After reading Section 4.2 we are not convinced that the trough exists. However, in section 4.3.2.1. a contaminant migration path is said to conform to the north-south tending trough identified in Sections 4.1.and 4.2. Section 4.3.2.1. gives the reader the impression that no question exists as to the presence of the trough. In summary, we are not sure of the reports position regarding the trough.

25. In section 4.3.2.1. the statement is made that the peak and subsequent decrease in contamination at the Friedrichsen well (shown on Figure 4.38) probably represent a leading edge "stringer" in advance of the main body of the plume, and that concentrations are expected to increase at this location in the future. We do not understand this logic since every one of the last seven samplings of the well have shown a decrease in contamination. Please elaborate on the conclusion that concentrations will increase.

26. We disagree with the statement made on 4-23 that the TCA concentrations in springs, over time, shown in figure 4.39 suggest a depleted source. We believe the data suggests the source has been reduced, but that it is not depleted.

27. We do not concur with the statement on page 4-23 that TCA concentrations will ultimately decrease in the fluvial aquifer because the lateral extent and thickness of Fluvial (unit) discussed in sections 4.1.1.7. and 4.1.2.7 is unknown, and the springs are only one point of discharge to the aquifer.

28. The migration rate for TCA on page 4-23 is unsubstantiated because no calculations are presented or referenced. Substantiate the rate by identifying the assumptions and displaying the calculations.

29. Please quantify "minor exceedances" used in Section 4.3.1.1. What numerical value constitutes a minor "exceedance"? Also, the minor

"exceedances" of TCA and DCE southeast of the landfill are not shown on the figures for Section 4.0 and should be shown.

30. In Section 4.3.2.2. the single general reference to landfill disposal history as a means for explaining contaminant migration is not acceptable. If landfill history is to be used for an explanation then state specifically how the history is a factor and provide the history for the reader. If reference is made to County records provide a copy of the records or a specific reference. We will attach little significance to conclusions based on evidence not provided for our files.

31. In Section 4.3.3. when using landfill history to support assumptions please follow the procedures in the above comment.

32. In Section 4.3.2.2 the reference to constituent concentrations decreasing to a level significantly below that which would be expected is not acceptable as evidence for the absence of DNAPLs. Please identify what levels would be expected, and explain why the observed levels deviate from expected levels.

33. In Section 4.3.2.2. the mention of constituent concentrations decreasing significantly is not sufficient to support the absence of DNAPLs. Explain significance. What other reasons for the decreasing levels were rejected before arriving at the absence of DNAPLs as the best explanation?

34. In Section 4.3.2.2. what other reasons for the distribution of contaminants were rejected before arriving at the absence of DNAPLs as the best explanation for the distribution?

35. In Section 4.3.2.2. please reference the low permeability contact with a cross section so the reader can find it.

36. In Section 4.3.2.2. please provide evidence or support for the statement that contaminant migration in the lower aquifers east of the landfill will revert to directions consistent with groundwater flow when no loner influenced by private pumping.

37. The estimates in table 4.4 can not be verified. Explain how the estimates were compiled. Please submit the calculations.

Please submit the calculations for the estimate of flow velocity in table ER-4.2

In regard to the groundwater monitoring in Section 5.2, what type of monitoring is envisioned to evaluate the performance of the East system?

38. The statement in section 4.3.3 that "significant masses of TCA and MC may remain in DNAPL form in the landfill refuge and in the vadose zone underlying the landfill" is not supported by any direct investigation of the refuge for such material. The means for supporting this statement are largely opinions dispersed throughout the report that can not be substantiated or verified. Also, sampling of the landfill revealed no DNAPL's. We do not accept this statement.

39. If it is important to determine whether the Upper Sand\Gravel Aquifer and the Lower Sand Gravel Aquifer are recharged by a common source than we suggest plotting three more wells from the Upper Sand\Gravel Aquifer in addition to the two wells plotted on the piper diagram in figure ER 4.45.

40. We do not understand the concept being developed in the last paragraph of Section 4.3.1.2. What conclusion(s) are to be drawn from the paragraph?

41. The basis for much of the discussion on contaminant migration in Section 4.3.2.2. is a reference to pumping from private wells as causing anomalous constituent migration observed in the Lower Aquifers. Reference is made to a description of the pumping "mechanism" in Section 4.2.6. However, Section 4.2.6 does not describe the mechanism. Section 4.2.6 merely lists pumping from private wells as one mechanism for a probable cause. We find no support for the conclusion that pumping from private wells has an impact on contaminant migration, and therefore, cannot concur with the conclusion.

42. On page E-15 of Volume III, explain the rationale for selecting the saturated thickness of 17 feet to estimate K for the Upper Sand\Gravel Aquifer. Please reference water level measurements and geologic logs.

43. On Page E-15, explain why a geometric mean was used for T and K instead of an arithmetic mean. Was the data log normally distributed and how did you make the determination? Table E-1 shows an average value, not a geometric mean.

44. On page E-16 an average value is reported for Sy. Is this an arithmetic mean? If so, why is an arithmetic mean used on one set of aquifer parameters and a geometric mean on another?

45. Where is the distance drawn down plot discussed in the first paragraph of page E-16? Please show the calculations for estimating the radius of influence.

46. What steps were taken to insure the transducers were operating properly? Were any measurements taken with an E-tape or tape measure to substantiate the transducer measurements for CP-W1 and CP-S1?

47. On page E-17 please explain the rationale for selecting 175 feet as the saturated thickness.

48. In analyses of both tests why is emphasis placed on an upward bound for T? Should not a lower bound be considered in the design process in order to consider the possibility of de-watering the aquifer?

49. Please describe to what extent the wells recovered. Is the recovery sufficient for the tests to be valid?

50. Borehole CD-4 is a pivotal borehole for several cross sections and for the conceptual model of groundwater flow shown in Figure 4.23. However, borehole CD-4 was installed with an air rotary rig by a consultant not affiliated with Phase I. In light of the reduced control over the lithology of borehole CD-4 what is the confidence level for hydrogeological interpretations based on CD-4?

51. Information is presented and discussed in this report that is taken from borehole logs not contained in the report. All borehole logs used in this report should be referenced so that a reader not intimately familiar with the project can find them.

52. This document is a draft report but is not labeled as such.

53. The scale accumulation in the well pump and stripping tower pose a major problems because the system was in operation for only a few days and remediation will most likely take years. Both permitting and logistical problems may arise if acid treatment is selected as a remedy. This problem should be addressed early in the Phase II design.

    A monitoring system will most likely have to be installed to prevent critical buildup of scale. Conceptually, the Phase I report should describe how will the scale buildup be dealt with?

54. Monitoring the performance of remediation as well as the impact of pumping on local aquifers and the Little Spokane River is critical. Conceptually, the Phase I report should describe how monitoring of the performance and impact will be dealt with.

55. No mention is made for groundwater monitoring down gradient of the East system. What is the conceptual plan for monitoring the performance of the East system?

56. Paragraph 4, page 4-28, the test indicates that the influent air temperature range experienced during the study represent the lower range of operating conditions for the full scale system, but that these are not the lowest temperatures anticipated. Does this imply that at lower temperatures the system may not be operated?

57. Paragraph 2, page 4-32, figures ER-4.46, ER-4.47, and ER-4.48 show data fit lines produced on the basis of small numbers of data points which are tightly clustered at two hydraulic loading rates. Most of these lines are essentially linear regressions performed on two points, and should not be assumed to accurately predict the removal efficiency of the treatment system between the clusters of data points.

58. Paragraph 2, page 4-33, while running counter to the theoretical behavior or air stipper systems as described in this section, Figures ER-4.49 and ER-4.50 might be reasonably interpreted as showing a nonlinear response to an increase in air/water ration. They seem to display a general decrease in removal efficiency for air/water ratios in the range of 70-75, with an increase in efficiency as the ration moves above 75.

59. Paragraph 3, page 4-31, the text states that the average influent and effluent concentrations of methylene chloride are presented in Table ER-4.6. These concentrations appear in Table ER-4.7.

60. Paragraph 1, page 4-346, the relationship between hydraulic loading and tower diameter should be explained. While the effects of varying hydraulic loading on treatment performance are discussed in Section 4.4.4.a, the effects on tower dimensions are not.

61. Paragraph 4, page 4-37: If different designs of packing materials are to be evaluated, that evaluation should have been one of the objectives of the treatability study. The two packing materials used in the study apparently are of similar design, and differ primarily in diameter and surface area. It should be explained in some detail how the empirical data about these two materials will prove useful in evaluating the published properties of packings with substantially different designs.

62 Appendix G-Example Calculations, page g-3, the origin of the Aquifer TCA Volume is not clear. The units on the term appear to indicate that it is the average concentration of TCA in a column with dimensions of unit area and thickness of the sturated layer. If this is the case, the example calculations do not illustrate all the steps outline in paragraph 5 of this section.

63. Appendix H-Table 2, the outputs listed do not include all the outputs shown in the results of modeling. On page 6 of the output, the column labeled "Z (ft)" is not explained, nor is the safety factor defined in terms of what is signifies.

64. The Phase I activities regarding air modeling are in agreement with previously established protocols.

Thank you for the report. If you have any questions, please do not hesitate to contact me at (206) 438-3079.

Sincerely,

Michael Kuntz

Michael Kuntz
Site Cleanup Section
Toxics Cleanup Program

MK:jr
cc: Neil Thompson
Larry Beard